U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
PB80-133564

EPA and the Academic Community Partners in Research

(U.S.) Environmental Protection Agency, Washington, DC

Dec 79

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-600/8-79-032		PB 80 133964

4. TITLE AND SUBTITLE	5. REPORT DATE
EPA and the Academic Community - Partners in Research	December 1979
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
Anticipatory Research Program Staff	
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO.
Office of Research & Development U.S. EPA Washington, D.C. 20460	11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED
Same as #9	14. SPONSORING AGENCY CODE EPA/600/00

15. SUPPLEMENTARY NOTES

16. ABSTRACT

This report describes EPA's anticipatory research program for establishing institutional research centers. The center concept is intended to obtain the assistance of the best available researchers to establish a focal point of continuing research in specific areas fundamental to environmental sciences. The focus of the center programs will be long-term (3-5 years) exploratory research which provides the link between basic and applied research. This brochure describes the 3 existing centers: Human Effects of Pollution at the University of Pittsburgh; Advanced Pollution Control Technology at the University of Illinois, Champaign-Urbana; Groundwater Research through a consortium of Rice University, Oklahoma State University & University of Oklahoma headquartered at the University of Oklahoma. The brochure describes the next centers and explains how to apply to become one of these centers. The new centers will focus on research in the following areas. Intermedia Transport Research, Ecosystems Research, and Ultimate Waste Elimination.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
	Grants, Exploratory Research, Administrative Assistance, Universities	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release to Public	Unlimited	19
	20. SECURITY CLASS *(This page)* Unlimited	22. PRICE PC A02 MF A01

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

United States
Environmental Protection
Agency

EPA-600/8-79-032
December 1979

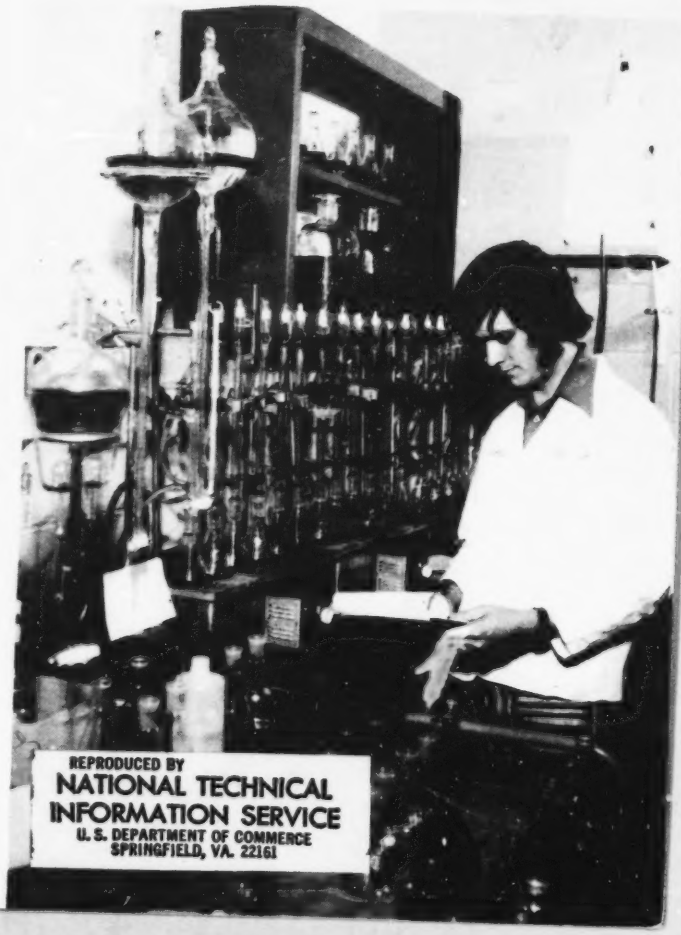
Research and Development

PB80-133564

EPA

EPA and the Academic Community

Partners in Research



REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

Solicitation for Institutional Letters of Intent to Develop Long-Term Exploratory Research Centers

The U.S. Environmental Protection Agency's Office of Research and Development has begun to establish a series of Institutional Centers to focus on long-term environmental problems and provide support for ongoing EPA programs. Three such Centers have initiated studies in the areas of Groundwater Research, Effects of Pollution on Human Health, and Advanced Pollution Control Technology. Three new centers focusing on Inter-Media Transport of Pollutants, Integrated Ecosystem Studies and Ultimate Waste Elimination will be funded in 1980.

This brochure describes the existing and proposed centers, the mechanism of formation and support, and the application procedure. ***Deadline*** for ***Letters of Intent*** is ***January 30, 1980***.

Introduction

The U.S. Environmental Protection Agency (EPA) was established in December of 1970 and was charged with a single overall mission—the protection and enhancement of the environment. The Agency was created by Presidential Reorganization Order involving the transfer and integration of 15 separate units of previously existing agencies. A single organization entity was thereby established for the control of environmental pollution, drinking water quality, environmental radiation and noise, solid wastes, pesticides, and other toxic substances. The purpose was to mount an integrated national attack on environmental pollution and to allow progression toward a full understanding of the total environment as a single system consisting of separate but interrelated parts.

The Office of Research and Development (ORD) functions as the principal scientific component of EPA. Its fundamental role is to produce scientific data and technical tools on which to base sound national policy in the development of effective pollution control strategies and the promulgation of adequate and viable environmental standards. ORD's research is supplemented by general scientific and technical research in other Federal agencies, the academic community, and elsewhere. ORD also supports the Agency's involvement in many international organizations with mutual environmental research and development (R&D) concerns.

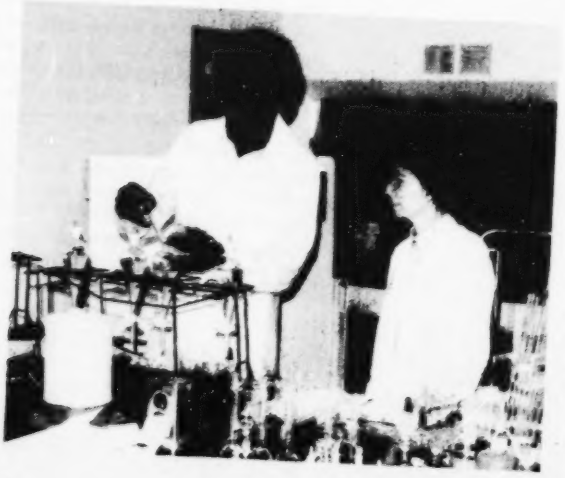
Exploratory Research Centers

Public Law 95-155, Section 6(b) of EPA's Research and Development Act of 1978 contained a Congressional request for examination of alternative approaches for

conducting long-term environmental research within EPA. In response, in April 1978 EPA published a report to the President and the Congress entitled "Laboratories Needed to Support Long-Term Research in EPA" (EPA-600/8-78-003). Subsequent Congressional action on EPA's FY-1979 and FY-1980 Appropriations Bills provided funds under ORD's Anticipatory Research Program for the establishment of Institutional Centers.

To start this program in FY-1979 ORD's Anticipatory Research Program established three new, innovative, exploratory research centers to focus on long-term environmental problems. The projected annual budget for each center is $0.5 million. The Centers have been established at the University of Pittsburgh, the University of Illinois, and one under a consortium arrangement between the University of Oklahoma, Oklahoma State Univesity, and Rice University. It is headquartered at the University of Oklahoma. Research at the University of Pittsburgh will focus on the human effects of pollution. Advanced pollution control technology will be the emphasis of research at the University of Illinois, Champaign-Urbana. There will be a concentration on groundwater research (e.g., drinking water, leachate problems) through the Rice-Oklahoma-Oklahoma State consortium.

The center concept is intended to obtain the assistance of the best available researchers to establish a focal point of continuing research in specific areas fundamental to environmental sciences.



The focus of center programs will generally be on long-term (3-5 years or longer) exploratory research which provides the link between basic and applied research as related to EPA's mission. The intent of EPA in employing the center mechanism is to integrate and build upon existing expertise and resources which are already developed. Center programs will be expected to provide an added capability and potential for accomplishments greater than those possible by support of individual projects alone. ORD plans to develop additional centers in this Fiscal Year to concentrate in the areas of Ultimate Waste Elimination, Intermedia Transport, and Integrated Ecosystems Studies.

Centers will be supported primarily through institutions or organizations with well-established expertise in a specified research area and a demonstrated commitment to such research. Support will therefore require moderate staff increases and limited investments in facilities and equipment.

Centers and their programs shall have a multimedia and multidisciplinary orientation, either by virtue of the expertise available on the center staff or by arrangements with the parent institution, other institutions, or individuals. Centers can be based within a single institution or within a consortium. Centers must have a firm basis within the institution that has a common interest in the public need as perceived by EPA and its advisors. This commonality of interest should be shared by leaders within the institution and EPA.

Center programs must be responsive to the long-term needs as perceived by all EPA laboratories whose activities are related to the center objectives. While each EPA laboratory has a central research emphasis, it is not an exclusive one. Thus, care must be exercised in order that center programs be representative of this diversity of EPA activities. Centers will therefore become, as intended, EPA-wide research resources rather than a resource responsive to a single laboratory.

In order to qualify as a center, the applicant institution must demonstrate an administrative structure that will foster successful scientific and administrative management. A key figure is the center director, who must be a recognized scientific or technical leader/manager and who must make a major time commitment to the scientific programs and administraton of the center. Because the center funds will be in addition to the funds of the institution's ongoing programs, the center director must have the ability to coordinate center activities in a manner that will benefit the overall program.

The scope of center activities includes:

- Serving as a resource for EPA laboratories with a given research area;
- Filling of research gaps and addressing areas requiring expansion;
- Stimulation of EPA's applied research programs;
- Providing a bridge between EPA and the academic/scientific community; and
- Serving as a source of new talent.

In general, center resources are not to be used to provide augmented support for ongoing projects within the purview of the center staff *per se*. Likewise, center resources are not generally tc be used to augment ongoing EPA short-term or applied programs. Exception to these restrictions may occur, for example, if an ongoing program is long-term, fills an objective of the center, and requires a substantially expanded effort.

The experience of other Agencies with similar center programs suggests three elements are of critical importance if the intent of center activities both in terms of the agency and institutional objectives and needs are to be accomplished. These are:

1. The active participation of a Policy Board whose membership includes as a minimum: EPA headquarters personnel, the appropriate EPA laboratory(s), and the center director. This board has the responsibility of providing overall guidance to the center and periodically reviewing progress.

2. A dedicated center director whose responsibility includes design and conduct of a research program consistent with the guidelines developed by the Policy Board.

3. Periodic interaction of the center director with a scientific advisory committee for purposes of programmatic review and recommendations.

The scientific advisory committee members should be external to the Agency and the institution and be broadly representative of the national perception of the research area.

Mechanism of Support

Support will take the form of a cooperative agreement as provided for by the Federal Grant and Cooperative Agreement Act of 1977 (Public Law 95-224).

Cooperative agreements differ from grants and contracts in that substantial involvement of the sponsoring agency in the center's direction and investigations takes place on a continuing basis. This involvement extends to exchange of center and agency personnel as appropriate to objectives of the center. As in a joint venture between two private parties, the whole range of factors affecting the venture and its outcome are the subject of negotiation. Responsibility for assuring performance is shared by the agency and the center.

Cooperative agreements are subject to provisions of EPA's General Grant Regulations (40 CFR Part 30 and Part 40, Research and Demonstration Grant Regulations) and to special conditions to be set in each agreement executed by the authorized official of the center and EPA.

In the long-term, a minimum of $500,000 per year of support for each center is anticipated. However, budget considerations may require a more limited support in the initial years. The support covers both direct and indirect costs. Execution of a cooperative agreement requires the recipient institution to contribute not less than five percent of the allowable project costs.

Application and Selection Process

Because of the time and resources required for preparation of detailed proposals, each applicant is required to submit a letter of intent prior to the preparation of a proposal. Criteria and guidelines for preparation of this letter are presented in this notice under the subheading, **Letter of Intent.** The EPA contact is:

MR. EDWARD A. SCHUCK (RD-675)
Director, Center Support Program
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, DC 20460

The *original* and *nine (9) copies* of letters of intent are due at this contact point by January 30, 1980. Please

provide a stamped, self-addressed envelope so that we may acknowledge receipt of your letter.

The Assistant Administrator for ORD will appoint a committee of internal and external scientists for each proposed center. Each committee will rank all letters and select the top applicants. These will be notified of their eligibility to submit a formal proposal and be supplied with instructions for proposal preparation. All applicants submitting letters of intent will be notified of the outcome of the review process not later than April 15, 1980.

Letter of Intent

In order to be eligible for consideration the letter of intent must adhere to the following format and limitations. A description on each center's research activities follows this section.

I. *Staff*—Identify the proposed center director, his/her time commitment, his/her staff and their working relationships.

II. *Strategy*—Plan for building upon the institution's expertise and resources.

III. *Program*—Description of present scientific program and proposed center activities.

IV. *Management*—Proposed approach for operating center and coordination with EPA.

V. *Background*—Experience of staff and institution in the area of proposed center activities.

VI. *Facilities*—Resources of the institution and their availability for use by the Center.

VII. *Local Review Statement*—A one- to two-page letter signed by the institution's chief executive officer which indicates how the proposed center relates to overall institutional goals, the institution's general support for the proposed effort, and its willingness to provide the necessary institutional resources for successfuly implementation of the center.

VIII. *Curriculum Vitae*—Curriculum vitae of the proposed center director and summarized (two pages for each one) curriculum vitae of key staff members (no more than five staff members).

That portion of the letter of intent covered by Section I through VI should not exceed 15 double-spaced pages typed on one side only. Sections VII and VIII may be single spaced. *Do not append additional material to the letter of intent as it will not be forwarded to the review committee.*

Highly detailed descriptions of ongoing or proposed programs should be avoided in the letter of intent. The review committee will primarily focus their evaluations on the institution's stated intent and ability to meet the need as broadly stated in this Notice. If the review committee requires further information, all eligible institutions (those submitting letters of intent by the stated deadline) will be given opportunity for additional response.

Center Descriptions

Intermedia Transport Research Center—EPA has traditionally supported research to investigate the movement of materials between the land, water, and atmosphere. Certain of these such as nitrogen materials (compounds) etc., have received considerable attention. However, the chemical/physical processes which govern the movement of toxic chemicals is not nearly as well understood. Nor are the consequences of such exchanges and the impact or interaction of these pollutants with natural ecosystems.

During the past decades, the growth of the power and chemical industries alone resulted in both an increased

volume and diversity of emissions. As these products are dispersed into the biosphere, they interact with each other and may produce undesirabale reaction products. This complex relationship can best be understood by examining the various components in depth. Thus, an understanding of the sunlight-induced reactions that air pollutants frequently undergo which produce physical and chemical changes is necessary to an understanding of the intermedia transport process, since directly emitted oxides of sulfur and nitrogen are transformed in the atmosphere to produce acidic particles and vapors. These atmospheric reaction products are primarily responsible for acid rain. Likewise, volatile organic compounds can be transformed in the atmosphere to more or less toxic organic gases and aerosols and be deposited on land or water surfaces. Pollutants removed from the atmosphere by virtue of gravitational fallout, impaction, or washout also end up as land and water contaminants. Some of these, such as lead, are relatively inert and remain in place on land surfaces with minimal interaction with soils or plants. Others, like particulate mercury compounds from coal-fired electric power facilities, interact with soil or organisms and plants to form the volatile and toxic gases methyl and ethyl mercury. Thus, we now recognize that there exists the need for better understanding of the chemical and physical processes which govern these and other intermedia transfers along with their long-term environmental effects and impact for human health.

Recent awareness of potential adverse effects of acid rain has focused considerable attention on the interaction between compounds of sulfur and nitrogen in the atmosphere and soils, biota, water, and sediments. As a consequence EPA, under its Anticipa-

tory Research Program, has mounted an intense research effort to determine causes and effects of acid precipitation. Much less effort has gone into investigation of the interactions and cycling of other atmospheric constituents, e.g., organics, and most metals. Thus, the research of this Center would focus on the interactions of those atmospheric pollutants, i.e., organics, metals, and other particulates, which are little understood. The investigations should be directed to the interface of these pollutants with land masses and large water bodies.

Questions which must be considered are:

What organic and inorganic chemicals are deposited as a result of dry and wet fallout?

How do temperature, humidity, vegetation growth, and other factors influence the pollutant condensing process?

How are chemicals purposefully placed on the land by man entrained into the atmosphere?

What are the mechanisms of action which control the exchange of pollutants between the land, atmosphere, and large bodies of water?

Are chemicals accumulating in the atmosphere which have heretofore not been recognized?

Investigations of well research pollutants and phenomena as well as those pollutants or issues currently under intense study should be minimized. Acid rain, lead, and ozone as well as runoff should only be considered to the extent they influence the interactions of the pollutants under investigation. The essential purpose of this center would be to advance the basic understanding of these phenomena in order to influence environmental decision making.

In planning and conducting its research activities the Center will work closely with the EPA's Environmental Sciences Research Laboratory in Research Triangle Park, North Carolina and other EPA labs concerned with the cycling of pollutants.

Ecosystems Research Center—Decisions on protecting the environment have been based largely upon data from individual biological species or individual physical/chemical processes. Usually, little or no pertinent information has been available from the level of the biological community or ecosystem. Even when systems level information has been available, its

significance has been very difficult to interpret. Indeed, the assumption is still not generally accepted that there are systems level processes or phenomena which are critical for maintaining desirable communities or ecosystems.

Although there has been considerable interest on the part of decision-makers in ecosystem level data, ecologists have not been generally successful in providing such data in useful form. This may be due to the complexity of the systems and the expense of generating data, or it may be due to sparsity of simplifying ecological concepts. During the past several years, interest in ecological data and assessment has sharply increased as public and private officials face increasingly difficult decisions regarding the benefits of additional levels of pollution control or the significance of chronic, low-level, or intermittent exposure to harmful substances.

Among the questions being asked are:

Are there systems level functions which are critical to the maintenance of desirable ecosystems or communities?

Are there systems level structural properties, e.g., food webs, which are critical to ecosystem functioning?

Are these structural properties or functions more sensitive to stress than individual components of the system?

How can ecosystems be described in terms of their value to man? For example, are there characteristics of ecosystems that can be evaluated to determine if, in response to stress, they contribute to different conditions, but of equal value to man?

Are there inherently stable or unstable states for ecosystems relating to their value for man?

Assuming there are sets of conditions to which ecosystems return when stressed, are there limits beyond which they can be stressed and not return? What is their rate of return to their original state?

How can an ecosystem be most simply and economically characterized to determine whether or not it is under stress and, if so, how severe and how persistent a stress?

What is the significance of variations in the severity or timing, e.g., continuous versus intermittent, of the stress?

Can an ecosystem's "condition" be usefully estimated by describing only its physical and chemical characteristics?

What systems level process or phenomena are significant for the transport and fate of toxic substances?

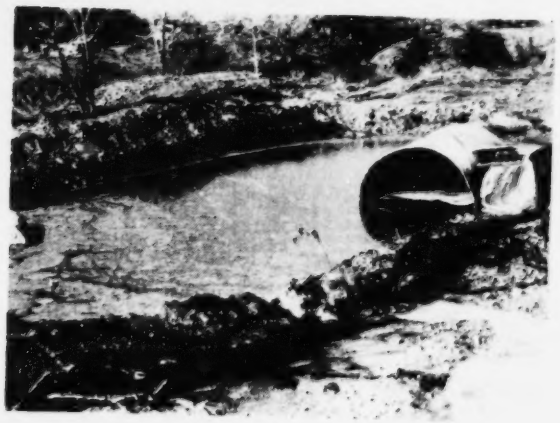
Are there certain components of ecosystems which are more useful or accurate in predicting toxics exposure levels than others?

The purpose of an *Ecosystems Research Center* would be to conduct the theoretical and empirical research necessary to answer these and other fundamental ecological questions relevant to public and private decisions on environmental protection. The Center would aim to advance the capability of ecological science to develop and apply systems level concepts in a manner useful to environmental protection decisions.

In planning and conducting research activities the Center will work closely with the EPA laboratories in Corvallis, Oregon; Duluth, Minnesota; Athens, Georgia; Ada, Oklahoma; Las Vegas, Nevada, and coordinate its activities with EPA's Science Advisory Board's Ecology Committee and the ecosystem

studies conducted by the National Science Foundation.

Ultimate Waste Elimination Research Center—As technologies advance, so do the variety, quantity, and complexity of unwanted by-products. Disposing of these waste materials which are often toxic has become a major and rapidly growing problem. Furthermore, the frequency of opportunity for accident and human exposure will increase as the population grows, chemical production increases, and uses proliferate. Heightened public awareness of these risks and resistance to their acceptance can be expected to mount rapidly, perhaps explosively.



Until recent times efforts to dispose of many hazardous wastes employed methods which dispersed these wastes into the air and water environments. However, the ability of these media to accept such impacts without resulting in significant environmental change has been shown to be limited. Some factors affecting these limitations include the magnitude and toxicity of the wastes, the dilution and dispersion rates and the biodegradability of the wastes. Recognition that serious degradation of our air and water was occurring led to application of control methods to prevent waste materials from entering these media. The control efforts which were generally employed included techniques such as filtration, extraction and precipitation. However, application of such techniques changed the character or concentration of the wastes, but often created yet another problem of waste disposal. As a consequence, these unwanted liquid and solid wastes were applied to land surfaces, buried or

forced into the earth via injection wells. At best, such practices represent a delaying tactic, since for many substances these disposal practices represent only temporary storage with great potential for subsequent water and air pollution. Recently discovered hazardous waste disposal sites attest to the problems poised by improper disposal or storage practices.

Given this situation, it is evident that a reexamination of the basic approaches aimed at eliminating wastes is warranted. It is also recognized that treatment technology will be necessary in any realistic scenario, given that 100% efficient processes are not likely. However, the efficiency/energy/resources associated with production of these by-product pollutants, the expense of controlling them, the unknown/undefinable environmental effect of disposal in some media, predicates the future need to reduce, eliminate, or reuse the unwanted by-product pollutants. It is to be noted that alternative production processes as well as recycle/reuse methodologies may have costs which appear to be prohibitive until the longer term costs of the "no change" situation is considered. Thus, "no change" implies acceptance of waste generation and the use of temporary storage practices, i.e., burial, well injection, etc. The future, but nevertheless eventual, costs of correcting environmental effects resulting from these practices must be added to the costs of the production process. It must be recognized that technology can no longer be dominated by the economics of the moment.

The purpose of this center would be to develop new approaches to reduce, eliminate, or reuse hazardous

by-product pollutants. It is expected that such approaches would eventually be utilized by environmental control programs. It is also suggested that a complete range of institutional and technological approaches might be pursued.

Questions which should be addressed include:

Are there new pollution production avoidance methods, i.e., clean technologies, which could be developed and tested?

Are there new approaches in the recycle/reuse arena which would enable hazardous wastes to be innovatively utilized as raw materials for other processes?

Are there new destructive technologies which could be developed to dispose of hazardous wastes?

Can the manufacturing processes or process characteristics that produce hazardous waste materials be described and categorized?

Are there manufacturing process controls that will prevent or reduce the formulation of hazardous wastes?

EPA is interested in understanding the proposer's qualifications in industrial processes and the experience in the broad spectrum of hazardous waste generation. Experience in organic chemical manufacturing is of particular interest.

The Center will work closely with EPA's Industrial Environmental Research Laboratories in Cincinnati, Ohio and Research Triangle Park, North Carolina, the Municipal Environmental Research Laboratory in Cincinnati, Ohio, the Advanced Control Technology Research Center at the University of Illinois as well as with industrial research organizations with similar interests and programs.